

Speaking of the same subject, Prof. R. F. Stupart, Director of the Canadian Meteorological Service, says:

There is an undoubted tendency for the wind at Quebec to blow either up or down the river, e. g., when the barometric gradient would indicate an easterly wind, not uncommonly Quebec reports northeast, or when from the gradient northwest winds are indicated southwest winds are reported.

As regards the velocity, I question whether the highest winds occur near the city of Quebec. I am rather of the opinion that they occur farther down the river. Father Point wind velocities are usually higher than those registered at Quebec. Monsignor Laflamme's description of the geographical situation of Quebec is, I think, admirable. This situation is doubtless the cause of the greater preponderance of northeast and southwest winds than at other points in the river and gulf, but on the other hand I imagine that the various winds in the province generally are not by any means the outcome of mere local conditions in that province. The wind circulation there is connected directly with the general circulation over the continent.

With regard to the conditions which produce the wind circulation over the continent, the Weather Bureau and Canadian meteorological records show that the general track of storms in the colder months is either from the Great Lakes or Atlantic States to the Gulf of St. Lawrence and thence to the North Atlantic; this stream of low areas, with the high areas moving southeastward from the Northwest Territories to the Great Lakes or Middle States, produces the prevailing westerly winds in the Gulf of St. Lawrence.

As the spring advances the general tendency becomes more pronounced for the high areas to develop over the northeastern portion of the continent in the neighborhood of Hudson Bay and move southeastward, while the hovering low becomes more frequent near the Great Lakes and the northeast parts of the United States, and such conditions produce easterly gradients over the whole St. Lawrence Valley; there is not the same marked prevalence of northeast winds at stations on the Gulf of St. Lawrence as in Quebec. Later on again as the summer advances, the continental low spreads eastward across Canada toward Labrador, and southwesterly and westerly winds become prevalent in Quebec.

During the past three years observations have been taken at Cape Fullerton, the northwest point of Hudson Bay, and I find that, with Dawson, Fort Chippewyan, Norway House, York Factory, and Moose Factory, a very interesting weather chart of the northern part of the continent is obtained, and one which will be useful in the study of the cold waves.

#### A MISTAKE ABOUT ATMOSPHERIC DUST.

The importance of dust in the economy of the atmosphere is not to be underrated, but neither should it be overestimated.

We notice a paragraph going the rounds of the newspapers on the authority of the Sunday School Times, saying:

While the dust contains many of our mortal enemies, it is also one of our very best friends, and the finer it is the more we owe to it. If there were no dust, the sky would not be blue, there would be no raindrops, no snowflakes, no hailstones, no clouds, no gorgeous sunsets, no beautiful sunrises. The instant the sun passes out of sight we should be in darkness; the instant it rises it would be a sharp circle of light in a black sky. \* \* \* Rays of sunlight go straight through all kinds of gases. \* \* \* The light that we call daylight is the light of the sun's rays reflected from the particles of dust in the air about our earth.

These and similar expressions show that the author is not quite up to date in his study of physics. Rays of light do not go straight through the atmosphere, but are bent in curves by atmospheric refraction, and our long twilights are partly due to the curvature of these rays. If dust is present in the air, the light reflected therefrom has various tints of gray or red, depending on the size and nature of the particles of dust, but if no dust is present, light may be reflected from any minute particles of water or ice that happen to be present, and these are not generally called dust. Molecules of water or ice

sometimes form minute drops by gathering about particles of dust as nuclei, but they can also form such drops without dust as nuclei, and must frequently do so. However, if neither dust nor water were present in the atmosphere, we should still have our ordinary blue sky light, and some sunset sky colors. The deep blue of the sky is due almost entirely to the selective dispersion of the various waves or rays of light that come from the sun, by the action of the molecules of the constituent gases of the atmosphere. The ability of these molecules to absorb and reflect any given wave length depends upon the relative dimensions of the wave and the molecule. The exact relation has been carefully worked out by Lord Rayleigh, whose formulae explain not only the blue color of the sky, but also the polarized condition of that light. Dust particles and ordinary water or ice particles are relatively so large that they reflect all rays of light, with a slight possible predominance of the red rays or long waves; consequently the hazy whites and grays of foggy weather and the dirty reds of the Indian summer may be attributed to dust and vapor, which in fact obscure the deep blue sky light.

Aqueous vapor in its finest condition, when it begins to condense without the help of dust nuclei, has the power of selectively reflecting the longer or bright blue as distinguished from the shorter dark blue of the pure upper sky; the resulting bluish haze may often be seen under favorable atmospheric conditions when we look at a distant landscape, and especially in the pure air of oceanic islands. The blue haze off the west coast of Scotland is proverbial. This haze was first studied in the laboratory by Tyndall, when he produced it unexpectedly by allowing dustless moist air to expand inside a vacuum tube.

The beautiful colored sunsets observed in connection with the eruption of Krakatoa, and especially the brilliant colors brought out by Prof. Carl Barus, of Brown University, in his study of cloudy condensation, are not due to dust nor to the selective reflection by fine particles, but are examples of a very different process, i. e., the colors of thin plates, or what Newton called the colors of thin films. The central portion of each little sphere of water transmits a minute beam of sunlight which has been reflected to and fro within the sphere, and its waves have interfered with each other. Some have been reinforced and others have been annulled. The former give the beam that is seen by the observer, and its color depends on the diameter of the sphere or the thickness of the film of water.

In general, therefore, our beautiful atmospheric colors are not altogether due to dust.

#### ADDENDUM.

*Hawaii.*—A rather wet November, except in leeward Maui and leeward Oahu. Mean temperatures approximately normal, although night temperatures were low at intervals. Cold, wet weather during middle portion of month retarded cane growth and field operations, especially in windward plantations; condition of cane in Kau, Hawaii, materially improved, however, by showers. Young pineapple plants in good condition all month, and ripening of winter fruit quite general by close of month. Second crop rice damaged by high winds and heavy rain during middle of month in northern Kauai, windward Oahu, and portions of windward Maui. Coffee picking in progress all month; indications of rather light yield in windward Hawaii, but above average in Kona, Hawaii. Most leeward pastures in need of rain all month.—*Alex. McC. Ashley.*

### THE WEATHER OF THE MONTH.

By Mr. WM. B. STOCKMAN, Chief, Division of Meteorological Records.

#### PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and V.

The isobars of mean pressure for the month closely approach in contour those of the normal for the month of November,

with an area of high pressure over the northwestern and another over the southeastern portion of the country and the area of lowest pressure over the southern Plateau region.

The mean pressure for the month was somewhat above the normal in the central and northern portions of Washington, northeastern Idaho, western Montana, northwestern Wyo-